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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

COCKS, JOSIAH C

ART UNIT PAPER NUMBER

3749

DATE MAILED: 10/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/766,132

Applicant(s)

SIRIGNANO ET AL.

Examiner

Josiah Cocks

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 15, 17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 15, 17 and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Receipt of applicant's amendment filed 7/27/2006 is acknowledged.

Terminal Disclaimer

2. The terminal disclaimer filed on 7/27/2006 disclaiming the terminal portion of any patent granted on this application, which would extend beyond the expiration date of U.S. Patent No. 6,877,978 has been reviewed and is accepted.

Drawings

3. The drawings filed on 7/27/2006 are accepted by the examiner.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 17 after amendment reads "The method of claim further comprising injecting an inert liquid." What claim does applicant intend claim 17 to be dependent upon. As best can be

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determined, and for the purpose of an examination on the merits, it appears applicant intends claim 17 to be dependent upon claim 15.

Correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-4, 6, 7, 10-12, 15, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 2,918,118 to Schirmer ("Schirmer '118").

Schirmer '118 discloses in the specification and Figures 1-6 an invention in the same field of endeavor as applicant's invention and substantially as recited in applicant's claims 1-4, 6,

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7, 10-12, 15, and 19-21. In particular, Schirmer '118 shows a combustor (10) comprising a cylindrical combustion chamber (interior of tube 12), a gas inlet (air inlet 20) formed in the first end of the chamber, and means for forming a liquid film on the combustion chamber's interior surface. In Schirmer '118, the porous tube (15) diffuses liquid fuel into the chamber (18). As noted in the first paragraph of column 3, "[t]he use of liquid fuel in this combustion apparatus provides for self-regulation of the wall temperature of the flame tube in accordance with the latent heat absorbed in the vaporization process occurring on the inner surface of the primary combustion chamber." Schirmer '118 also states that "the fuel is delivered uniformly onto the entire inner surface of the primary combustion chamber." (see col. 1, line 68 through col. 2, line 1, see also col. 2, lines 70-72). Thus, the apparatus is considered to operate in the same manner as applicant's apparatus (e.g. as described on pages 6 and 7 of applicant's specification).

In regard to the limitation that the fuel film is stable, as noted above, Schirmer '118 clearly teaches that the fuel film is "provided uniformly to the entire wall of the combustion chamber" (col. 2, lines 70-72). Webster's II New Riverside University Dictionary (1988) defines "uniform" as "[b]eing without variation or fluctuation." The examiner therefore considers that the fuel film formed by Schirmer '118 is properly to be considered stable as recited in applicant's claims.

In regard to the recitation of "liquid fuel injectors," Schirmer '118 clearly provides that multiple liquid fuel injectors may be employed (see col. 4, lines 33-37).

In regard to claim 7, the pores of tube (15) comprise a plurality of orifices.

Schirmer '118 possibly does not disclose the lateral dimension of the chamber being sub-centimeter, and more particularly in the range of 1.0 to 3.0 millimeters, and the length being in the range of 1.0 to 10.0 centimeters.

However, in regard to these limitations relating to the size/dimensions of the combustion chamber, it has been held that limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art. See MPEP § 2144.04(IV)(A) (citing *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) quoting “mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled”). In this case the combustor of Schirmer '118 provides no limitation as to its size and functions for the same purpose of spreading a uniform fuel layer along the walls of the combustion chamber, which results in improved combustion efficiency and stability (see col. 2, lines 8-11). Thus, the examiner considers it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to have scaled the apparatus of Schirmer '118 to applicant's dimensions since it has been held that limitations relating to the size of the packet, or associated “scaling up” were not sufficient to patentably distinguish over the prior art. As the apparatus of Schirmer '118 operates in the same manner as applicant's apparatus the examiner adjustment of the recited dimensions of the combustor are not considered to patentably distinguish applicant's invention.

9. Alternatively, claims 1-5, 7, 10, 11, 15, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 3,078,672 to Meurer (“Meurer”).

Meurer discloses in the specification and Figures 1-4 an invention in the same field of endeavor as applicant's invention and substantially as recited in applicant's claims 1-5, 7, 10, 11, 15, and 19-21. In particular, Meurer shows a combustor comprising a combustion chamber (1), a gas inlet (2) formed in a first end of the chamber, and means for forming a liquid film on the combustion chamber's interior as recited (the nozzles (3) (see col. 2, lines 64-65) of Meurer emit liquid fuel into the chamber (1)). Further, as noted in the last paragraph of column 2:

"Fuel injection nozzle 3 represents but one of several nozzles which may be used. The fuel emerges through the slit opening 3a and is immediately deposited upon the inner wall of chamber 1 as a solid fuel jet 4 and, without traversing any free path, is immediately spread as a film of fuel 4a on the inner all of chamber 1."

Thus the apparatus operates in the same manner as applicant's apparatus (e.g. as described on pages 6 and 7 of applicant's specification).

In regard to the limitation that the fuel film is stable, the examiner considers that the thin fuel formed in Meurer is evenly spread on the walls of the combustion chamber by the swirling motion of the air and is properly considered to be stable as recited in applicant's claims.

In regard to claim 3, see column 2, line 8 of Meurer describing a cylindrical shape of the chamber.

Meurer possibly does not disclose that the lateral dimension of the chamber being sub-centimeter, and more particularly in the range of 1.0 to 3.0 millimeters, and the length being in the range of 1.0 to 10.0 centimeters.

However, in regard to these limitations relating to the size/dimensions of the combustion chamber, it has been held that limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art. See MPEP § 2144.04(IV)(A) (citing *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) quoting "mere scaling up of a prior art process capable

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of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled"). In this case the combustor of Meurer expressly provides that the size of the combustion chamber is kept to a minimum (see col. 1, lines 15-17). Thus, the examiner considers it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to have scaled the apparatus of Meurer to applicant's dimensions since it has been held that limitations relating to the size of the packet, or associated "scaling up" were not sufficient to patentably distinguish over the prior art. As the apparatus of Meurer operates in the same manner as applicant's apparatus and is concerned with overall size minimization, the recited dimensions of the combustor are not considered to patentably distinguish applicant's invention. Further, the examiner considers that based on the clear disclosure of Meurer in optimizing the size of (specifically minimizing) the combustion chamber, a person of ordinary skill in the art would reasonably optimize the size of the combustion chamber of Meurer through routine experimentation. The size of this combustion chamber is considered to be a result-effective variable. Such optimization of a result effective variable has been held to be within the ability of a skilled artisan and does not serve to patentably distinguish applicant's invention. See MPEP 2144.05(II)(A).

10. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meurer as applied to claim 7 above, and further in view of U.S. Patent No. 3,955,361 to Schirmer et al. ("Schirmer '361").

Meurer discloses all the limitations of claim 8 and 9 except for the injector oriented tangentially and orthogonally to the major flow within the chamber.

Schirmer '361 discloses a fuel/air mixer/combustion chamber in the same field of endeavor as both applicant's invention and Meurer. Schirmer '361 teaches the use of injectors (49) oriented tangentially and orthogonally to the major flow within the chamber to form an annular stratum around the swirling stream of air to effect controlled mixing of the fuel and air (see col. 1, line 57 through col. 2 line 4 and Fig. 7).

Thus, it would have been obvious to one of ordinary skill in the art at the time of applicant's invention to provide the apparatus of Meurer with the injectors oriented tangentially and orthogonally to the major flow within the chamber as taught by Schirmer '361 to desirably form an annular stratum around the swirling stream of air to effect controlled mixing of the fuel and air (see Schirmer '361, col. 1, line 57 through col. 2 line 4 and Fig. 7).

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Meurer as applied to claim 15 above in view of U.S. Patent No. 4,604,988 to Rao ("Rao").

Meurer teaches all the limitations of claim 17 (see discussion of the teachings of Meurer above) with the possible exception of further injecting an inert liquid.

Rao teaches a combustor intended to provide heat transfer between a flame and a liquid flow (see at least the abstract). Rao is considered to be both in the same field of endeavor as applicant's invention and Meurer and to be reasonable pertinent to the problem faced by applicant in injecting an inert liquid (water) into a liquid fuel for dispersal in a combustion chamber. Accordingly, Rao is clearly analogous art. In Rao, in addition air and a liquid fuel, an inert liquid (water, see at least see at least col. 6, lines 47-57) is added to the combustion chamber for the desirable purpose of transferring heat to the inert liquid flow and for forming an

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additional protective layer on the interior of the combustion chamber (See Rao, at least col. 3, lines 66 through col. 4, line 22, the abstract, and col. 1, lines 6-16).

Therefore, in regard to claim 17, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combustor of Meurer to incorporate the injection of an inert liquid as taught in Rao for the desirable purpose of transferring heat to the inert liquid flow and for forming an additional protective layer on the interior of the combustion chamber (See Rao, at least col. 3, lines 66 through col. 4, line 22, the abstract, and col. 1, lines 6-16).

Response to Arguments

12. Applicant's arguments filed 7/27/2006 have been fully considered but they are not persuasive.

Applicant again asserts that the recitation in applicant's claims of a "sub-centimeter" dimension distinguishes over the prior art, particularly Schirmer '118 or Meurer. To support this assertion applicant argues that scaling down the combustors of Schirmer '118 and Meurer would not be obvious to one of ordinary skill in the art because in addition to scaling down the size it would be necessary to include injecting liquid fuel to form a liquid fuel layer on the interior of the combustion chamber (see response, p. 7). However, as was previously noted and as noted above, each of Schirmer '118 and Meurer already disclose forming a liquid fuel film on the interior surface of each combustion chamber (see sections 8 and 9 above). Further, the examiner has pointed to support in the MPEP for the assertion of obviousness in adjusting the size of the combustors of the prior art references. However, regarding Meurer in particular, in addition to

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forming a liquid fuel layer Meurer expressly provides that keeping the size of the combustion chamber to a minimum is desirable (see Meurer, col. 1, lines 15-17) and providing the shortest possible combustion time is desirable (see Meurer, col. 1, lines 37-51). These unambiguous disclosures in Meurer run contrary to applicant's argument that a person of ordinary skill in the art would not reasonably scale down the combustor size of Meurer or include a liquid fuel layer on the interior surface of the combustion chamber. Applicant does not appear to comment or address these teachings of the references, in particular that of Meurer, the examiner has identified.

Applicant also argues that "the examiner fails to provide a reason why one having ordinary skill in the pertinent art would have been led to modify Schirmer '118 or Meurer to arrive at the claimed invention" (response, p. 9). However, the examiner notes that the examiner has relied upon clear rationale stemming from case law that suggests the obviousness of merely adjusting the size of elements of an apparatus. Further, particularly regarding Meurer, the examiner has pointed to clear teachings within this reference that suggest the size of the combustion chamber is a result effective variable that is desirably optimized through minimizing the size of the combustion chamber. As noted above, it has been held that such optimization of a result-effective variable through routine experimentation would be obvious to a person of ordinary skill in the art. See MPEP 2144.05(II)(A). Accordingly, the recitation in applicant's claims does not serve to patentably distinguish applicant's invention over the prior art.

Applicant also argues that Rao is non-analogous art. The only statement made in support of this assertion is "Rao considers a situation in his vortex device where the liquid is not the fuel or a chemical reactant." (response, p.10). However, the examiner notes that Rao finds

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classification in class 431 relating to combustion. Applicant's invention also finds classification in class 431. Further, both Rao and applicant's invention are considered with supplying an additional inert liquid (water) to a combustion device in which a liquid fuel and an oxidant are combusted. Therefore, Rao is considered to be both in the same field of endeavor as applicant's invention and reasonably pertinent to the same problem addressed by applicant and is properly considered to be analogous art.

Accordingly, applicant's claims are not considered to patentably distinguish applicant's invention over the prior art of record.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Josiah Cocks whose telephone number is (571) 272-4874. The examiner can normally be reached on M-F 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ehud Gartenberg can be reached on (571) 272-4828. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jcc
September 30, 2006


JOSIAH COCKS
PRIMARY EXAMINER
ART UNIT 3749